Eliminating Chlorinated Hydrocarbon Wastes

The Catoxid Environmental and Policy Success Story

The EOP Group, Inc.

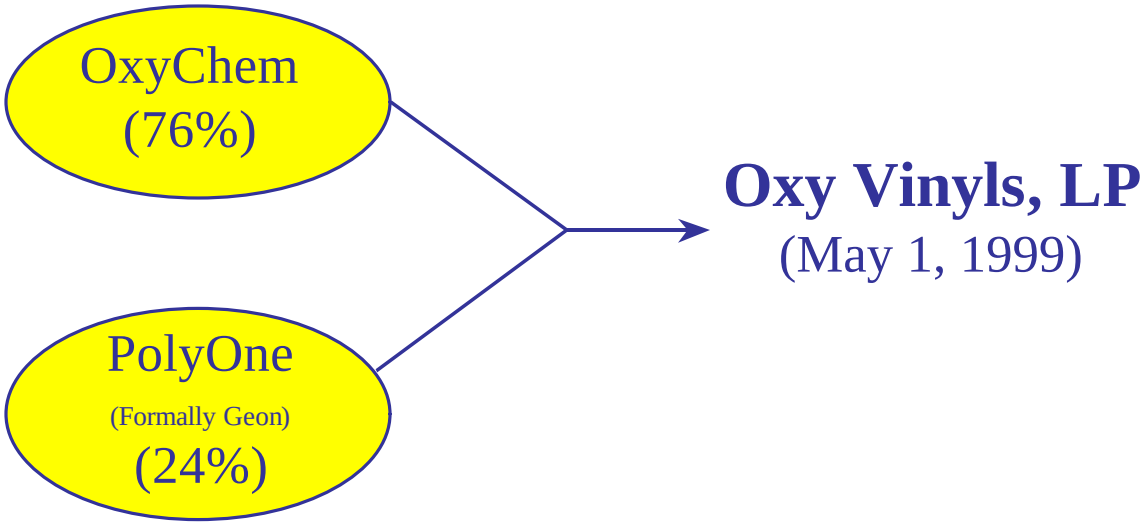
Overview

- **Catoxid is an innovative technology to reuse chlorinated hydrocarbon byproducts**
- **In November 2001, EPA clarified its RCRA status and exempted existing units from permitting**
- **Using Catoxid avoids thermal treatment for over 300,000 tons of material**
  - **Equivalent to 1 % of nation's thermally treated RCRA waste**

Overview

- **Collaborative effort between industry and regulators to resolve technical and policy issues quickly**
  - **EPA Region 6 and 4**
  - **EPA Headquarters**
  - **OxyVinyls, LP**
  - **The Dow Chemical Company**
  - **The EOP Group, Inc.**

Oxy Vinyls, LP



The BFGoodrich Company
1870

The Geon Company
1993

Oxy Vinyls, LP
1999

Technology leadership built on a foundation created by the originators of the vinyl industry.

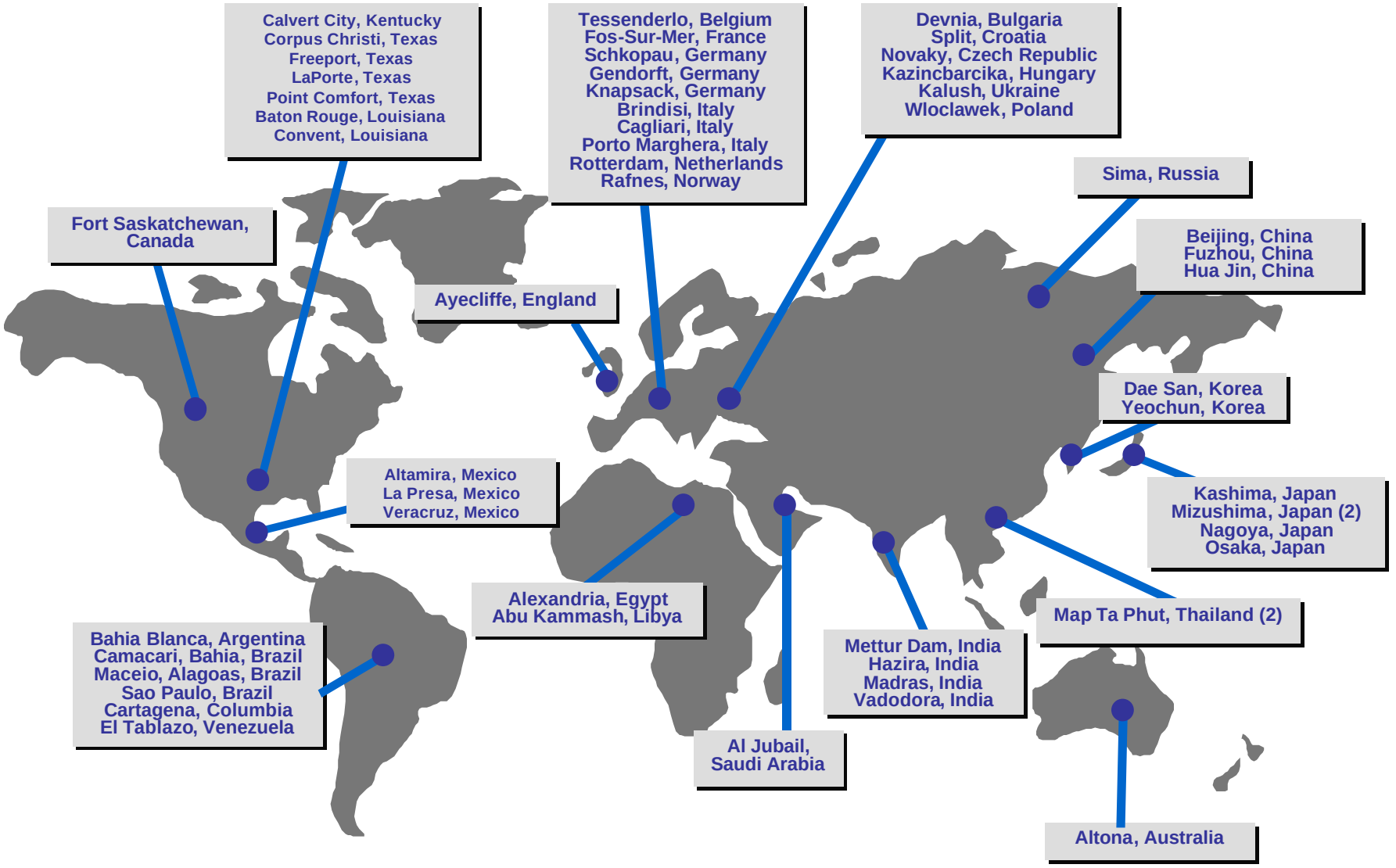
Technology Licensing Experience

- Major Producer of EDC, VCM & PVC
  - VCM Capacity = 2.7 Million MTA
  - PVC Capacity = 1.9 Million MTA
- Commercial Production Experience
  - First EDC Cracking to VCM: 1959
  - First Balanced Plant: 1964
- EDC/VCM Technology Licensor
  - Licensor Since 1965
  - 61 Licenses Granted
- Current World Capacity of EDC/VCM Plants Using OxyVinyls Processes
  - (Million Metric Tons Per Year)

	Operating	Design/Construction
EDC	13.0	2.8
VCM	8.8*	0.9

*35% of Total World Production - 50% of World Capacity Available for License

EDC/VCM Licensee Locations



Catoxid™ Process Overview

- Catoxid™ is an innovative catalytic manufacturing process with substantial waste minimization benefits
- Environmental benefits include:
  - a reduction of hazardous wastes
  - reduced transportation risks
  - emissions lower than competing technologies

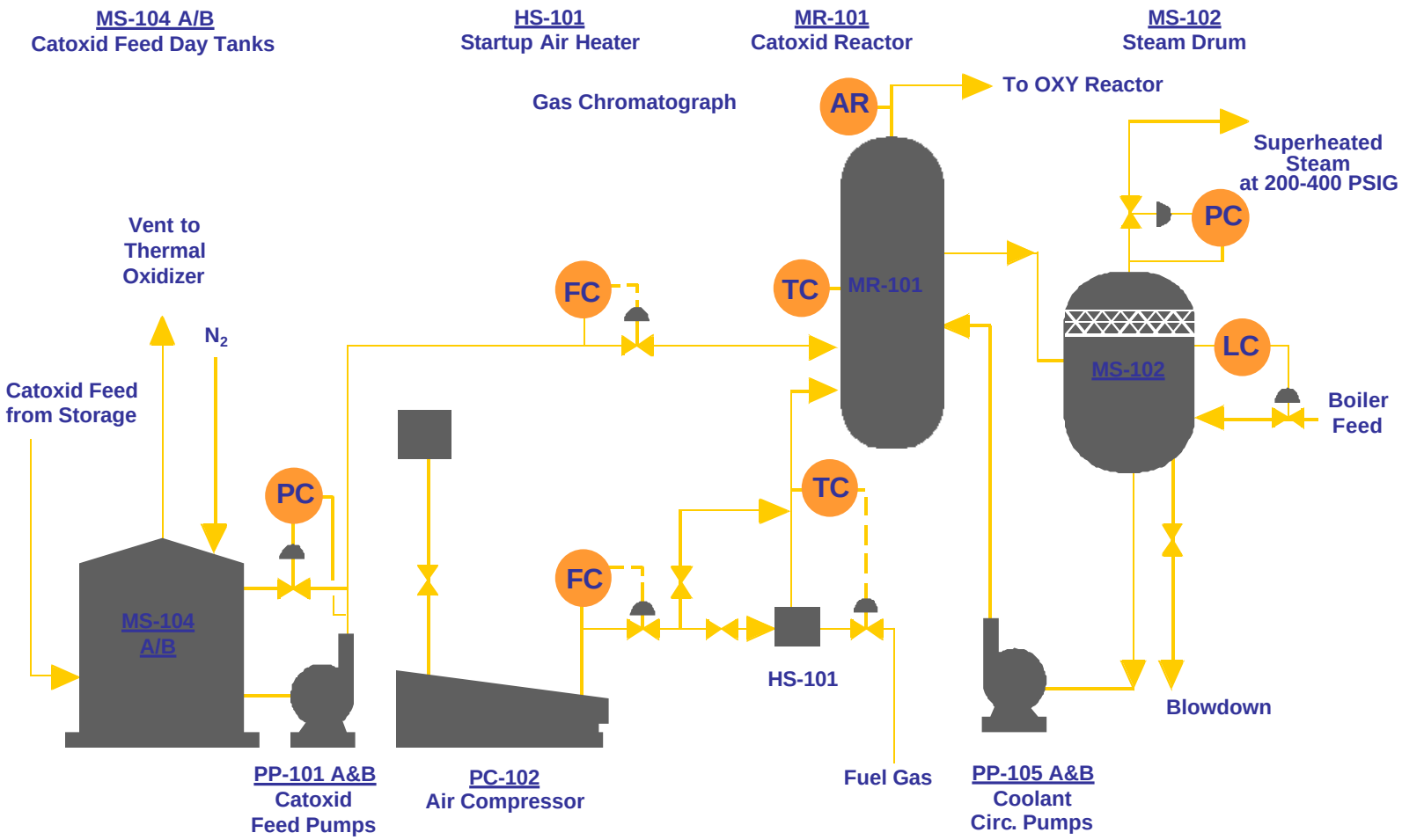
Catoxid™ Process

- The Catoxid™ process mixes chlorinated hydrocarbons with oxygen in the presence of a fluidized catalyst to form HCl, water, and CO2

- All gases produced are piped directly into the oxychlorination reactor where HCl formed in the Catoxid™ process is reacted with ethylene to form EDC

Catoxid™ Process

Catoxid™ Process



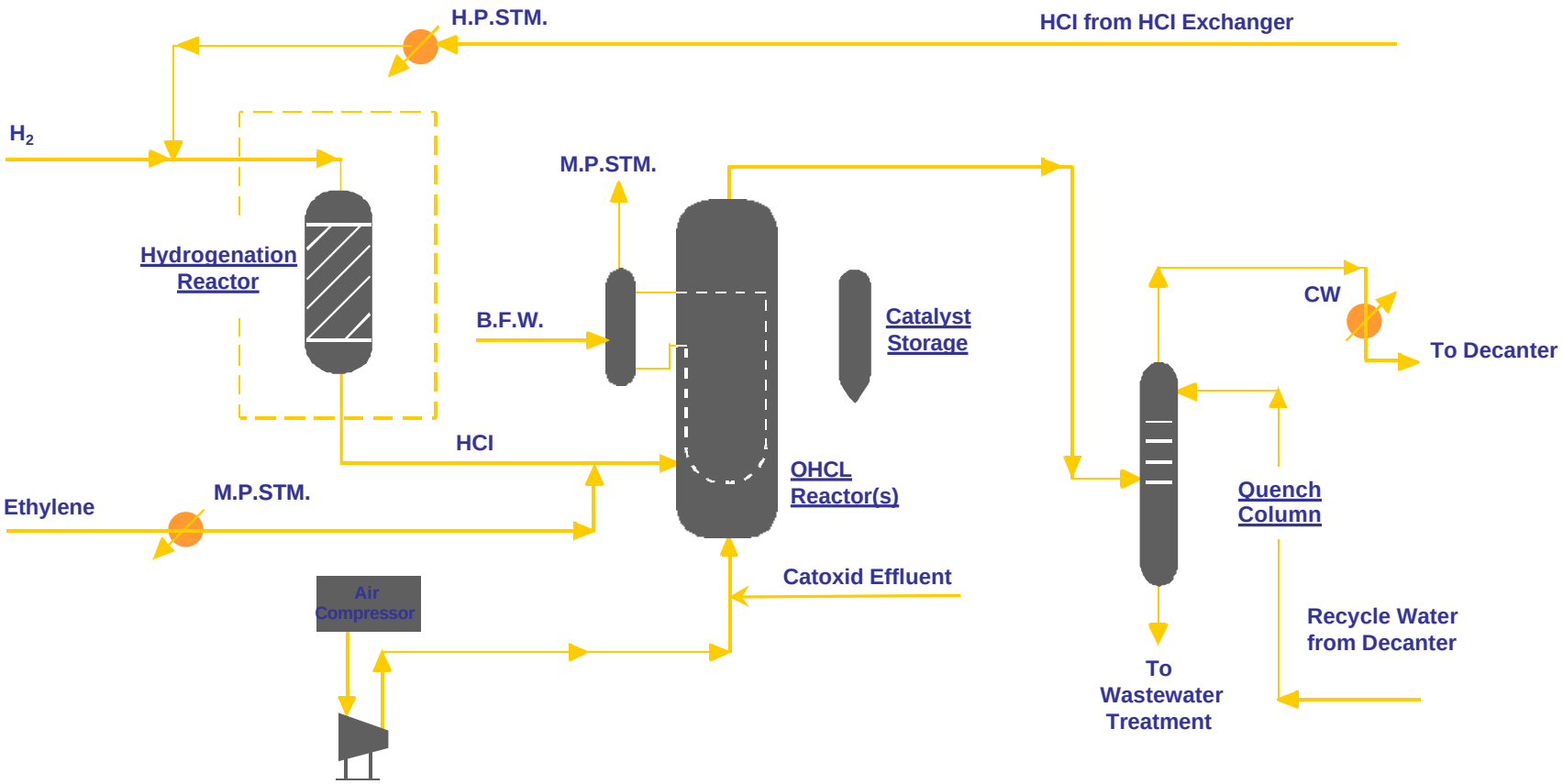
Catoxid™ Feeds

- Chlorinated hydrocarbons are fed to Catoxid™ based on their chlorine content
- Feeds typically range from 47% to 81% chlorine

Catoxid™ Process

- No emission vents from the Catoxid™ reactor
  - it is totally enclosed
- Effluent gases from the Catoxid™ reactor flow directly into the oxychlorination reactor where HCl is reacted to form EDC
  - No acid product is produced
  - No reclamation of effluent prior to use in EDC process

Oxyhydrochlorination Unit
Air-Based



Catoxid™ Material Balance Example*

- 30,000 lb/hr chlorinated hydrocarbons are fed to Catoxid™
- More than 60% of the feed is converted to HCl, and subsequently to EDC in Oxychlorination
  - ~20,000 lb/hr HCl is produced by Catoxid™
  - ~27,000 lb/hr EDC equivalent chlorine requirement
  - A nearly 80,000 TPA reduction in chlorine consumption
  - Balance is of feed is converted to CO_2 and water

* From a recent (2000) Catoxid™ process design

Catoxid™ Catalyst

- **Catoxid® 5** is Oxy Vinyls' patented, state of the art, alumina supported, chromium based catalyst for this process.
- Similar in particle size distribution to OxyVinyls' Oxychlor® catalysts
- Excellent heat transfer properties/temperature control
- Indefinite catalyst life

Regulatory Questions

- **Is it a Halogenated Acid Furnace (HAF)?**
- **Are the feed materials solid wastes?**

Is Catoxid a HAF?

- **Although Catoxid produces HCl, EPA determined it was not the unit it envisioned in the BIF rule**
  - **Doesn't scrub acid from combustion gases**
- **EPA found Catoxid is a closed chemical manufacturing process, typical of routine manufacturing**

Are the Feed Materials Solid Wastes?

- **Catoxid Feeds are Not:**
  - **Disposed of**
  - **Spectulatively accumulated**
  - **Used in a manner constituting disposal**
  - **Used to produce a fuel or contained in fuel**
  - **Reclaimed**
- **Policy: Coordinated dialogue between regulatory agencies resolved issues quickly and clearly**

Are the Feed Materials Solid Wastes?

- **EPA's 2001 memo pointed out use/reuse exemption**
  - **Left to authorized States to decide**
  - **Earlier EPA determination that material is not a solid waste**

- **States with Catoxid have determined that current feeds are exempt**

Regulatory Discussions

- Concerns raised as a new Catoxid unit was being permitted in fall 2000.
- Interested companies worked together with agencies to identify all technical and policy questions in spring-summer 2001.
- Open dialogue cleared away misunderstandings and focused debate on underlying policy benefits.
- States, Regions, and Headquarters all participated.

Conclusion
Successes

- **Environmental: Catoxid is a proven waste minimization technology to reuse materials that would have to be thermally treated.**